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Early infant diagnosis and outcomes in HIV-exposed infants at a central and a district hospital, Northern Malawi

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Setting: Mzuzu Central Hospital (MZCH), Mzuzu, and Chitipa District Hospital (CDH), Chitipa, Malawi.
Objective: To compare management and outcomes of human immunodeficiency virus (HIV) exposed infants in early infant diagnosis (EID) programmes at MZCH, where DNA polymerase chain reaction (PCR) testing is performed on site, and CDH, where samples are sent to MZCH, between 2013 and 2014.
Design: Retrospective cohort study.
Results: Of infants enrolled at MZCH (n = 409) and CDH (n = 176), DNA PCR results were communicated to the children's guardians in respectively 56% and 51% of cases. The median time from sample collection to guardians receiving results was 34 days for MZCH and 56 days for CDH. In both hospitals, only half of the dried blood spot (DBS) samples were collected between 6 and 8 weeks. More guardians from MZCH than CDH received test results within 1 month of sample collection (25% vs. 10%). Among the HIV-positive infants, a higher proportion at MZCH (92%) started antiretroviral therapy than at CDH (46%). The relative risk (RR) of death was higher among infants with late DBS collection (RR 1.3, 95%CI 1.0–1.7) or no collection (RR 5.8, 95%CI 4.6–7.2), and when guardians did not receive test results (RR 8.3, 95%CI 5.7–11.9).
Conclusion: EID programmes performed equally poorly at both hospitals, and might be helped by point-of-care DNA PCR testing. Better programme implementation and active follow-up might improve infant outcome and retention in care.

Preventing mother-to-child transmission (PMTCT) is a key strategy in eliminating new paediatric human immunodeficiency virus (HIV) infection and improving maternal and newborn survival.[1,2] Under the PMTCT strategy, early infant diagnosis (EID) targets HIV-exposed infants (i.e., babies born to HIV-positive women) through HIV DNA polymerase chain reaction (PCR) testing at 6 weeks, along with prompt initiation of antiretroviral therapy (ART). These interventions have been shown to reduce HIV disease progression by 75% and infant mortality by 76%.[3] However, EID programmes in resource-poor settings—mainly in sub-Saharan Africa—face many challenges, such as difficult transportation of specimens from peripheral health centres to specialised laboratories, long turnaround times for diagnosis and feedback of results, and high losses to follow-up of HIV-exposed infants.[4–8] Overall, only 54% of infants undergo EID between 6 and 8 weeks.[9]

Malawi has been running PMTCT programmes for many years. In July 2011, the country developed and adopted Option B+ as the national approach, and formally incorporated this policy into the revised national HIV/AIDS (acquired immune-deficiency syndrome) guidelines in 2014.[10,11] The World Health Organization (WHO) adopted Option B+ as its recommended PMTCT strategy in 2016.[12] Within Option B+, HIV-exposed infants are enrolled into an ongoing EID programme that emphasises DNA PCR testing at 6 weeks, ART for infants with confirmed HIV infection and follow-up of all children up to 24 months or 6 weeks after cessation of breastfeeding. At this time, HIV-negative children are discharged from care, while those who are HIV-positive continue on ART and cotrimoxazole preventive therapy (CPT). Despite the simplicity of this approach, the scale-up and implementation of Option B+, HIV testing and ART in HIV-exposed infants within EID programmes remain challenging.[5,13]

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), 58 000 HIV-infected women delivered babies in Malawi in 2013; however, only 15% underwent DNA PCR testing for HIV within 2 months of birth.[14] Past studies have indicated particular problems in timely EID uptake and implementation,[5,13,15–17] but few have further explored how testing implementation may impact routine programme outcomes. We hypothesised that infants in an EID programme situated in a central hospital that performs DNA PCR testing on site might have better performance and outcomes than those enrolled in an EID programme in an outlying district health facility, where samples have to be sent to a central laboratory for testing. If this is so, it might persuade peripheral district hospitals to invest in better logistics for sample delivery and communication of results or point-of-care diagnosis for DNA PCR.

The aim of the present study was to describe and compare the management and outcomes of HIV-exposed infants in Malawi registered in an EID programme at a central hospital and a hard-to-reach district hospital between 2013 and 2014.

METHODS

Study design

This was a cohort study of HIV-exposed infants enrolled in an EID programme using routinely collected programme data.

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Setting

General setting

Malawi is a landlocked country in Southern Africa, with a population of 16 million and an estimated gross national income per capita of US$730 in 2012.[18] Health care is provided free of charge in the public sector throughout the whole country for all diseases. Since AIDS was first recognised in Malawi in 1985,[19] the country has suffered from a severe HIV/AIDS epidemic, with an HIV prevalence of 11% in the general population and 8% among pregnant women.[20,21] Total fertility is high, at 4.4 children per woman.[21]

Early Infant Diagnosis programme

All pregnant women undergo HIV testing at their first antenatal care visit, and are enrolled in the Option B+ programme if they are HIV-positive. HIV-exposed infants are enrolled into the EID programme at birth, when they are identified and referred from the post-partum ward to the HIV clinic. Alternatively, children may be referred from the under-five clinics if the birth did not take place at the health facility. The stages of the EID programme for the HIV-exposed infants are described in Figure 1. At all facilities, the dried blood spot (DBS) method is used for collecting DNA PCR samples among children, with the blood collected from heel or toe pricks and transferred onto a protein saver card (Whatman Ltd, Piscataway, NJ, USA). The DBS cards are dried for a minimum of 3 h and packaged with desiccant sachets before being transferred to the reference laboratory.[11] Once DBS collection has taken place, HIV-exposed infants are prescribed cotrimoxazole and scheduled monthly visits for mother-infant follow-up and drug refills. DNA PCR test results are communicated to the guardians during these visits. Patients lost to follow-up (LTFU) are traced at both sites: at Mzuzu Central Hospital (MZCH), expert clients are engaged to follow up mothers who have missed appointments; at Chitipa District Hospital (CDH), health surveillance assistants (HSAs) trace patients LTFU within their catchment community. Both programmes rely on the availability of resources (transport and airtime for communication) for active client tracing.

Site-specific setting: Mzuzu Central Hospital and Chitipa District Hospital

Located in Mzuzu City, MZCH is one of the four tertiary hospitals in Malawi and the main referral hospital in the Northern region. The hospital laboratory functions as the reference laboratory in the region and is equipped with DNA PCR testing facilities. CDH is located in the northernmost district, approximately 360 km from Mzuzu. An asphalt road connects the two hospitals, which enables motor vehicles to travel from Chitipa to Mzuzu in 5 h. Both hospitals run EID programmes through their ART and HIV care clinics, in accordance with the national PMTCT guidelines.[11]

At MZCH, DNA PCR testing samples are packaged and taken from the hospital clinics to the laboratory soon after the samples are dried, usually by the day after collection. Messengers deliver samples from the clinics to the laboratory at the request of the clinic personnel.

At CDH, packaged samples are stored while awaiting transport to Mzuzu. At the time of the study, samples and reports of test results were transported by ambulance, with no routine services, as trips are made based on need for patient referrals and administrative matters. This could span weeks to months. DNA PCR results are printed on paper and kept at the laboratory until they are collected by CDH staff. The results are occasionally communicated by telephone, but this method is generally discouraged due to concerns about patient confidentiality.

Patient population

The patient population consisted of all HIV-exposed infants at MZCH and CDH registered in the EID programme between January 2013 and December 2014.

Data variables, data sources and data collection

Data were extracted using a structured proforma from three primary data sources: the paper-based EID programme register, electronic laboratory database and individual patient master cards. The information was validated by cross-referencing the three data sources. When discrepancies were identified, data from the patient master card and the laboratory database were used.

Variables included year of enrolment, site, sex, date of birth, dates on which DBS samples were collected, received and processed at the laboratory, and the dates on which the results were received by the health care worker and the guardian. We also collected information on DNA PCR results, ART initiation status and timing, and outcome of the infant at 12 and 24 months. Outcomes were defined as retained in care, died, transferred out or LTFU. Infants were considered to be retained in care if there was a record of their return visits and HIV rapid test results at months 12 and 24. Infants who did not return after 3 months from their last appointment date were registered as LTFU. Data were collected between March and September 2016 in MZCH and CDH.

Analysis and statistics

Data were entered from the structured proforma into a spreadsheet (Excel, Microsoft Corp, Redmond, WA, USA), then managed and analysed using Stata Statistical Software, Release 11 (StataCorp LP, College Station, TX, USA). The median turnaround times for EID testing and implementation were compared using the Wilcoxon rank-sum test. The results of the DNA PCR testing and outcomes at months 12 and 24 between the two hospitals were compared using the χ^2 and Fisher's exact tests. Poisson regression was used to calculate relative risk (RR) of death. The level of significance was set at 5% ($P = 0.05$).

Ethics approval

Permission to carry out the study was obtained from the respective hospital management teams. Local ethics approval was obtained from the Malawi National Health Sciences Research Committee in Lilongwe, Malawi (approval number: NHSRC #15/5/1422). As the study fulfilled the exemption criteria set by the Ethics Review Board (ERB) of Médecins Sans Frontières (MSF),

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Conflicts of interest: none declared.

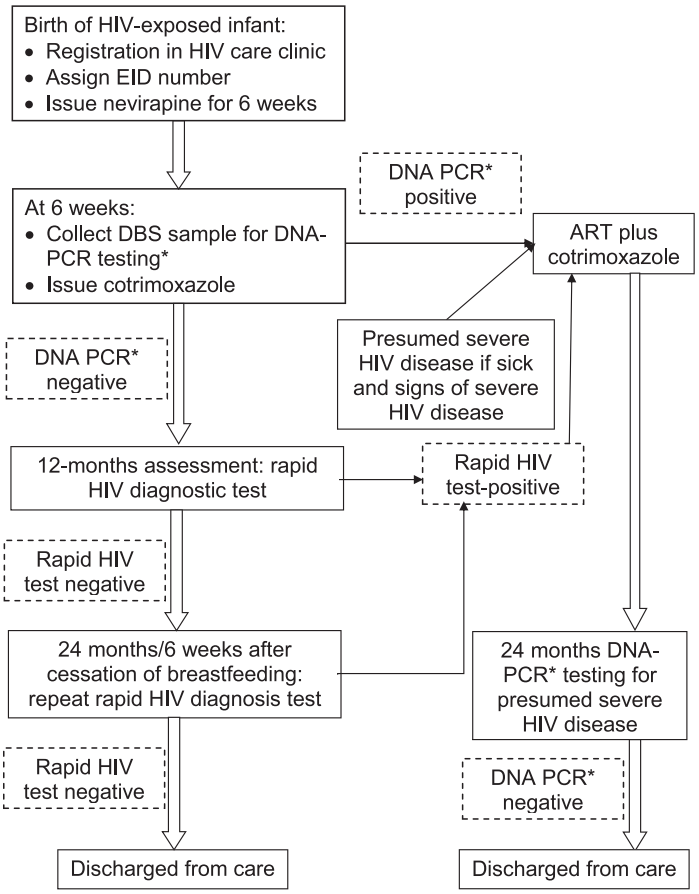

FIGURE 1 Stages of the EID programme from the birth of an HIV-exposed infant.[11] *Viral DNA test using PCR. HIV = human immunodeficiency virus; EID = early infant diagnosis; PCR = polymerase chain reaction; DBS = dried blood spot; ART = antiretroviral therapy.

Geneva, Switzerland, for a posteriori analyses of routinely collected data, it did not require a full MSF ERB review. The study was approved by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France. As this was a record review study, informed patient consent was not required.

RESULTS

A total of 585 HIV-exposed babies were registered in the EID programme: 409 from MZCH and 176 from CDH (Table 1). The cascade of events of the EID programme is shown in Figure 2. Although both hospitals had a similar overall trend, the retention rate at different stages of the EID programme cascade differed. Among all the infants registered in the EID programme, only half of the guardians received test results: 56% in MZCH and 51% in CDH. In MZCH, only 76% of registered infants had a DBS sample collected, but all collected samples were processed. In CDH, 89% of infants had DBS collected, but 9% of the collected samples were not processed. In MZCH, 61% of the registered infants had their results received by the health care worker compared to 53% in CDH.

The time taken for successful events to happen along the cascade are shown in Table 2. The median infant age at DBS collection was 7 weeks (interquartile range [IQR] 6–11) for MZCH and 8 weeks (IQR 7–15) for CDH. There was a significant overall delay from DBS collection to receipt of the DNA PCR result by the guardians in CDH (median 56 days) compared with MZCH (median 34 days). The main delay for CDH was incurred between sample collection and receipt at the central laboratory, with a median delay of 14 days (IQR 6–21) compared to 4 days (IQR 1–7) at MZCH. The median age at ART initiation for infants who were HIV-positive was 20 weeks (IQR 11–48) at MZCH and 42 weeks (IQR 33–50) at CDH.

The timing of HIV testing and outcomes of HIV-exposed infants at MZCH and CDH are shown in Table 3**.** In both hospitals, only half of the DBS samples were collected between 6 and 8

TABLE 1 Number and sex distribution of infants enrolled in the EID programme at MZCH and CDH, Northern Malawi, 2013–2014

Characteristics	MZCH *n* (%)	CDH *n* (%)
Total, *n*	409	176
Year enrolled in the EID programme		
2013	175 (43)	119 (68)
2014	234 (57)	57 (32)
Sex		
Male	206 (51)	88 (50)
Female	193 (48)	86 (49)
Not recorded	10 (1)	2 (1)

EID = early infant diagnosis; MZCH = Mzuzu Central Hospital; CDH = Chitipa District Hospital.

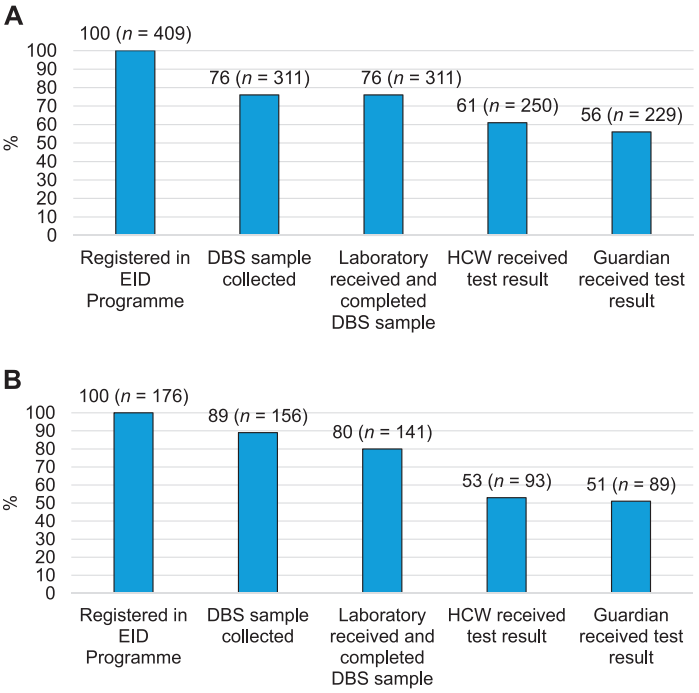

FIGURE 2 The cascade of events from enrolment of infants in the EID programme through to communication of results of DNA PCR testing* to children's guardians at Mzuzu Central Hospital and Chitipa District Hospital, 2013–2014: **A)** Mzuzu Central Hospital; **B)** Chitipa District Hospital. Results are percentages of infants enrolled in the EID programme. *Viral DNA test using PCR. EID = early infant diagnosis; DBS = dried blood spot; HCW = health care worker; PCR = polymerase chain reaction.

TABLE 2 Time taken to complete the different events of the EID programme at MZCH and CDH, Northern Malawi, 2013–2014

	MZCH		CDH		
Timing of key EID events	*n*	Median [IQR] (range)	*n*	Median [IQR] (range)	*P* value*
Infant age at DBS collection, weeks	309	7 [6–11] (1–56)	157	8 [7–15] (1–59)	0.002
Infant age at ART initiation, weeks	9	20 [11–48] (10–53)	4	42 [33–50] (27–53)	0.31
Time taken to get from one event to the next stage of the EID programme, days					
From collection of DBS to arrival in laboratory	285	4 [1–7] (0–91)	109	14 [6–21] (0–112)	<0.01
From DNA PCR test† result to receipt by HCW at the health facility	156	2 [0–9.5] (0–133)	65	5 [0–36] (0–104)	<0.01
From receipt of DNA PCR test† result by HCW to receipt by guardian	229	3 [0–13] (0–281)	92	2 [0–8.5] (0–81)	0.60
Overall: from collection of DBS to receipt of DNA PCR test† result by guardian	232	34 [23–54] (0–328)	90	56 [34–71] (0–190)	<0.01

*Calculated using Wilcoxon rank-sum test.
†Viral DNA test using PCR.
EID = early infant diagnosis; MZCH = Mzuzu Central Hospital; CDH = Chitipa District Hospital; IQR = interquartile range; DBS = dried blood spot; ART = antiretroviral therapy; PCR = polymerase chain reaction; HCW = health care worker.

weeks, with 101 samples (25%) in MZCH and 70 samples (40%) in CDH collected late. Guardians at MZCH received HIV test results in a more timely manner, with 101 (25%) receiving results within 1 month of DBS collection, compared to 18 (10%) at CDH. Of those infants found to be HIV-positive, a significantly higher proportion at MZCH (92%) started ART compared with CDH (46%). In both hospitals, there were similar high rates of LTFU at months 12 and 24.

The mortality rate and the RR for death were significantly higher among infants who did not have DBS collected on time

TABLE 3 Test timing and outcomes of infants registered in the Early Infant Diagnosis Programme at MZCH and CDH, Northern Malawi, 2013–2014

Outcomes	MZCH *n* (%)	CDH *n* (%)	*P* value
Total, *n*	409	176	
Timing of DBS collection			
On time (6–8 weeks)	208 (51)	87 (49)	<0.001
Not on time (>8 weeks)	101 (25)	70 (40)	
Not collected	100 (24)	19 (12)	
Guardian receives results			
Within 1 month of DBS collection	101 (25)	18 (10)	<0.001
>1 month after DBS collection	131 (32)	72 (41)	
Guardian not notified/unknown	176 (43)	86 (49)	
DNA PCR test result*			
Positive	12 (3)	13 (7)	<0.001
Negative	294 (72)	119 (68)	
Not done/not recorded	103 (25)	44 (25)	
DNA PCR-positive and started on ART			
Yes	11 (92)	6 (46)	0.015
No	1 (8)	7 (54)	
12-month outcomes			
Retained in care, HIV-negative	217 (53)	127 (72)	<0.001†
Retained in care, HIV-positive	12 (3)	6 (3)	
Died	3 (1)	1 (<1)	
Transferred out	78 (19)	4 (2)	
LTFU	98 (24)	38 (22)	
24-month outcomes‡			
Discharged from care, HIV-negative	91 (52	81 (68)	<0.001†
Retained in care, HIV-positive	4 (2)	4 (3)	
Died	3 (2)	1 (<1)	
Transferred out	19 (11)	0	
LTFU	58 (33)	33 (28)	

*Viral DNA test using PCR.
†Fisher's exact test used for small cell counts.
‡For the 2013 cohort only.
MZCH = Mzuzu Central Hospital; CDH = Chitipa District Hospital; DBS = dried blood spot; PCR = polymerase chain reaction; ART = antiretroviral therapy; HIV = human immunodeficiency virus; LTFU = lost to follow-up.

TABLE 4 Mortality rate and RR of death of infants and children in the Early Infant Diagnosis Programme at 12 months by test timing and result notification status at Mzuzu Central and Chitipa District Hospitals, Northern Malawi, 2013–2014

	Infants *n*	Total py*	Deaths *n*	Mortality rate/1000 py	RR† for deaths (95%CI)
Time of DBS collection					
On time	295	260.5	1	3.8	1.0
Not on time	171	145.5	2	13.7	1.3 (1.0–1.7)
Not collected	118	67.0	1	14.9	5.8 (4.6–7.2)
Time guardian notified of HIV test result					
Within 1 month of DBS collection	119	114.0	1	8.8	1.0
>1 month after DBS collection	203	196.5	0	NA	0.5 (0.3–0.8)
Not notified/not recorded	262	166.5	3	18.0	8.3 (5.7–11.9)

*Calculated based on the following assumptions: 1) infants who were successfully followed up to 1 year contributed 1 py; 2) infants who died contributed 0.5 py; as date of death was not captured, it was not possible to ascertain the actual py contribution; 3) infants who were transferred out or lost to follow-up contributed 0.5 py. While it was not possible to identify the specific time point, this is under the assumption that the events happened throughout the 1-year period.
†Estimated using Poisson's regression adjusted for py exposure.
RR = relative risk; py = person-year; CI = confidence interval; DBS = dried blood spot; HIV = human immunodeficiency virus; NA = not available.

(RR 1.3, 95% confidence interval [CI] 1.0–1.7) or not collected at all (RR 5.8, 95%CI 4.6–7.2) than those who had DBS collected on time (Table 4). Infants were at significantly higher risk for death (RR 8.3, 95%CI 5.7–11.9) where guardians did not receive the test results than those who received results within 1 month of DBS collection.

DISCUSSION

This study comparing a regional referral hospital (MZCH) and a hard-to-reach district hospital (CDH) in Malawi found some common bottlenecks along the EID cascade, but also specific challenges in the two settings. First, among all infants enrolled in the EID programme at the two hospitals, more than one third of the DNA PCR test results did not reach the health workers, and about 50% did not reach the guardian. For MZCH, the main decline occurred between registration and DBS collection, as many infants who were registered in the programme did not have their DBS sample collected. For CDH, a significant number of collected DBS samples did not reach the reference laboratory, and a large proportion of results were not received by the health care worker.

Second, the overall turnaround time from collection of DBS sample to the receipt of test results by the guardian was a median of 34 days for MZCH and 56 days for CDH. This is a shorter turnaround time than in rural Zambia,[8] longer than the 9 days reported in Botswana,[22] but comparable to times found in Kenya, Tanzania, Uganda and Nigeria.[7,16,17,23] Long turnaround times may contribute to guardians not receiving results and delayed ART initiation.[7] Compared to the median ART initiation age of 9 months reported elsewhere in Malawi,[24] the age at ART initiation was younger at MZCH and older at CDH. Nevertheless, all initiated later than 12 weeks, which is when peak mortality occurs.[25]

Third, while EID testing at 6 weeks improves outcomes,[26] implementing the testing algorithm according to recommended guidelines in African countries remains challenging.[13,17] The impact of late or no DBS collection and not feeding results back to guardians were shown to increase the risk of death in our study cohort.

The strengths of the study were the relatively large number of infants enrolled and followed up in the EID programme until outcome assessment at months 12 and 24. Limitations included the use of routinely collected data, which might be inaccurate, and the fact that no information was collected about the reasons for delays at key stages of the cascade. No maternal characteristics were collected to allow further analysis of potential confounders. Furthermore, there were high rates of LTFU/transfer-out of infants in both hospitals. LTFU occurred at approximately the same level at different stages of the DBS collection cascade, and we addressed these with censorship at 6 months in the analysis of mortality and RR.

Despite these limitations, several policy and practice implications stem from this study. First, it was observed that only half of the registered HIV-exposed infants underwent DBS collection within the recommended timeline.[11] This deficiency may be because HIV-exposed infants do not attend clinics according to scheduled appointments. While expert clients or HSAs are used to counselling and following up HIV-infected women on the EID process, this needs to be strengthened and the importance of 'timely' re-attendance emphasised.

Second, there is a need to enforce formal routines within the EID programme across all settings by putting in place standard operating procedures on acceptable timeframes for sample delivery and communication of results. The Ministry of Health needs to monitor and review the times taken for EID cascade events as key service delivery indicators.

Third, investing in point-of-care (POC) viral load testing may improve receipt of DNA PCR results for the EID programme.[27] A POC testing model has been piloted at MZCH since late 2015. Preliminary unpublished results show that the processing time is within 1 h and test results are being delivered to the guardians on the same day. This acceleration in turnaround would be particularly beneficial for hard-to-reach sites such as CDH.

In conclusion, this study has shown that although there were unique challenges at different stages of the EID programme in each hospital, risk of death was higher in infants with delayed DBS collection and for those whose guardians did not receive the test results. The situation can be improved by establishing formal routines and considering POC DNA PCR testing.

References

1 World Health Organization. Programmatic Update. Use of antiretroviral drugs for treating pregnant women and preventing HIV infection in infants. WHO/HIV/2012.6. Geneva, Switzerland: WHO, 2012.
2 World Health Organization. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach. Geneva, Switzerland: WHO, 2013.

3 Violari A, Cotton M F, Gibb D M, et al. Early antiretroviral therapy and mortality among HIV-infected infants. N Engl J Med 2008; 359: 2233–2244.
4 Cherutich P, Inwani I, Nduati R, Mbori-Ngacha D. Optimizing paediatric HIV care in Kenya: challenges in early infant diagnosis. Bull World Health Organ 2008; 86: 155–160.
5 Dube Q, Dow A, Chirambo C, et al. Implementing early infant diagnosis of HIV infection at the primary care level: experiences and challenges in Malawi. Bull World Health Organ 2012; 90: 699–704.
6 Adebimpe W O. Challenges facing early infant diagnosis of HIV among infants in resource poor settings. Afr J Reprod Health 2013; 17: 122–129.
7 Mugambi M L, Deo S, Kekitiinwa A, Kiwaga C, Singer M E. Do diagnosis delays impact receipt of test results? Evidence from the HIV early infant diagnosis program in Uganda. PLOS ONE 2013; 8: e78891.
8 Sutcliffe C G, van Dijk J H, Hamangaba F, Mayani F, Moss W J. Turnaround time for early infant HIV diagnosis in rural Zambia: a chart review. PLOS ONE 2014; 9: e87028.
9 UNAIDS. 2016 Children and HIV: fact sheet. Geneva, Switzerland: UNAIDS, 2016. http://www.unaids.org/en/resources/documents/2014/20140508_FactSheet_Children Accessed April 2017.
10 Schouten E J, Jahn A, Midiani D, et al. Prevention of mother-to-child transmission of HIV and the health-related Millennium Development Goals: time for a public health approach. Lancet 2011; 378: 282–284.
11 Ministry of Health, Malawi. Clinical management of HIV in children and adults. Malawi Integrated guidelines for providing HIV services in: antenatal care; maternity care; under 5 clinics; family planning clinics; exposed infant/pre-ART clinics; ART clinics. 2nd ed. Lilongwe, Malawi: MoH, 2014.
12 World Health Organization. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach. 2nd ed. Geneva, Switzerland: WHO, 2016.
13 Perez G M, Metcalf C, Garone R, et al. HIV testing and retention in care of infants born to HIV infected women enrolled in 'Option B+', Thyolo, Malawi. Public Health Action 2014; 4: 102–104.
14 UNAIDS. 2014 progress report on the global plan. Geneva, Switzerland: UNAIDS, 2014. http://www.unaids.org/sites/default/files/documents/JC2681_2014-Global-Plan-progress_en.pdf Accessed April 2017.
15 Chatterjee A, Tripathi S, Gass R, et al. Implementing services for Early Infant Diagnosis (EID) of HIV: a comparative descriptive analysis of national programs in four countries. BMC Public Health 2011; 11: 553.
16 Anoje C, Aiyenigba B, Suzuki C, et al. Reducing mother-to-child transmission of HIV: findings from an early infant diagnosis program in south-south region of Nigeria. BMC Public Health 2012; 12: 184.
17 Kiyaga C, Lee H H, Allain J P. Adherence to early infant diagnosis testing algorithm, a challenge to early infant diagnosis program in resource limited settings of Uganda. J HIV Clin Scientific Res 2015; 2: 030–039.
18 World Health Organization. World Health Statistics, 2014. WHO/HIS/HSI/14.1. Geneva, Switzerland: WHO, 2014.
19 Kanyerere H, Harries A D, Tayler-Smith K, et al. The rise and fall of tuberculosis in Malawi: associations with HIV infection and antiretroviral therapy. Trop Med Int Health 2016; 21: 101–107.
20 Ministry of Health, Malawi. Integrated HIV program report (April–June 2016). Lilongwe, Malawi: Department of HIV/AIDS, 2016.
21 National Statistical Office. 2010 Malawi Demographic and Health Survey, 2011 Edition. Zomba, Malawi: NSO Malawi, 2011.
22 Creek T, Tanuri A, Smith M, et al. Early diagnosis of human immunodeficiency virus in infants using polymerase chain reaction on dried blood spots in Botswana's national program for prevention of mother-to-child transmission. Pediatr Infect Dis J 2008; 27: 22–26.
23 Ciaranello A L, Park J-E, Ramirez-Avila L, et al. Early infant HIV-1 diagnosis programs in resource-limited settings: opportunities for improved outcomes and more cost-effective interventions. BMC Med 2011; 9: 59.
24 Braun M, Kabue M, McCollum E, et al. Inadequate coordination of maternal and infant HIV services detrimentally affects early infant diagnosis outcomes in Lilongwe, Malawi. J Acquir Immune Defic Syndr 2011; 56: e122–e128.
25 Bourne D E, Thompson M, Brody L L, et al. Emergence of a peak in early infant mortality due to HIV/AIDS in South Africa. AIDS 2009; 23: 101–106.
26 Francke J, Penazzato M, Hou T, et al. Clinical impact and cost-effectiveness of diagnosing HIV infection during early infancy in South Africa: test timing and frequency. J Infect Dis 2016; 214: 1319–1328.
27 Essajee S, Vojnov L, Penazzato M, et al. Reducing mortality in HIV-infected infants and achieving the 90-90-90 target through innovative diagnosis approaches. J Int AIDS Soc 2015; 18 (Suppl 6): 20299.

Contexte : Hôpital central Mzuzu (MZCH), Mzuzu, et hôpital de district de Chitipa (CDH), Chitipa, Malawi.
Objectif : Comparer la prise en charge et les résultats des nourrissons exposés au virus de l'immunodéficience humaine (VIH) dans les programmes de Diagnostic précoce du nourrisson (EID) au MZCH (test ADN réaction polymérase en chaîne [PCR] fait sur place) et au CDH (échantillons envoyés au MZCH) entre 2013 et 2014.
Schéma : Etude rétrospective de cohorte
Résultats : Parmi les nourrissons enrôlés au MZCH (*n* = 409) et au CDH (*n* = 176), les résultats d'ADN PCR ont été communiqués aux responsables des enfants dans 56% et 51% des cas, respectivement. Le délai médian du recueil de l'échantillon à la réception des résultats par les parents a été de 34 jours pour le MZCH et de 56 jours pour le CDH. Dans les deux hôpitaux, seulement la moitié des échantillons de sang séché (DBS) a été recueillie entre 6 et 8 semaines. Plus de parents du MZCH que du CDH ont reçu les résultats du test dans le mois suivant le recueil de l'échantillon (25% contre 10%). Parmi les nourrissons VIH positifs, une proportion plus élevée au MZCH (92%) a mis en route le traitement antirétroviral comparée au CDH (46%). Le risque relatif de décès a été plus élevé parmi les nourrissons ayant eu un recueil tardif de DBS (RR 1,3 ; IC95% 1,0–1,7) ou pas de recueil (RR 5,8 ; IC95% 4,6–7,2) et quand les parents n'ont pas reçu les résultats du test (RR 8,3 ; IC95% 5,7–11,9).
Conclusion : Les programmes d'EID ont été aussi peu performants dans les deux hôpitaux et pourraient être améliorés par la possibilité de réaliser sur place le test PCR ADN. Une meilleure mise en œuvre du programme et un suivi actif pourraient améliorer les résultats pour les nourrissons et leur rétention en soins.

Marco de referencia: El Hospital Central de Mzuzu (MZCH) y el Hospital Distrital de Chitipa (CDH), en Malawi.
Objetivo: Comparar el manejo y los desenlaces clínicos de los lactantes expuestos al virus de la inmunodeficiencia humana (VIH) en los programas de diagnóstico temprano del lactante (EID) en el MZCH (realización local de pruebas mediante la reacción en cadena de la polimerasa a partir de ADN [PCR-ADN]) y el CDH (muestras enviadas al MZCH) del 2013 al 2014.
Método: Fue este un estudio retrospectivo de cohortes.
Resultados: De los lactantes inscritos en el MZCH (*n* = 409), el resultado de la prueba PCR-ADN se comunicó a la persona encargada del niño en un 56% de los casos; esta proporción fue 51% en los lactantes inscritos en el CDH (*n* = 176). La mediana del lapso entre la obtención de la muestra y la entrega de los resultados a los encargados fue 34 días en el MZCH y 56 días en el CDH. En ambos hospitales, solo la mitad de las muestras de sangre seca (DBS) se recogió en 6 a 8 semanas. Más tutores de los lactantes en el MZCH que en el CDH recibieron el resultado de la prueba en el primer mes después de haber aportado la muestra (25% contra 10%). De los lactantes con resultado positivo frente al VIH, inició tratamiento antirretrovírico una mayor proporción de los niños atendidos en el MZCH (92%) que en el CDH (46%). El riesgo relativo (RR) de mortalidad fue más alto en los lactantes en quienes se obtuvo la muestra de DBS tardíamente (RR 1,3; IC95% de 1,0 a 1,7), en quienes no se obtuvo (RR 5,8; IC95% de 4,6 a 7,2) y cuando los tutores no recibieron los resultados (RR 8,3; IC95% de 5,7 a 11,9).
Conclusión: El desempeño de los programas EID fue igualmente deficiente en ambos hospitales y se podría mejorar con la práctica de la prueba PCR-ADN en el momento de la atención. Una mejor ejecución del programa y un seguimiento activo contribuiría a obtener desenlaces clínicos más favorables en los lactantes y a retenerlos en los servicios de atención.

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